

IN THE CLAIMS

1. (Previously Amended) A torch for heating a member attendant a metal bonding operation, comprising:

a torch head having an oxygen passageway and a fuel gas passageway formed therein, each passageway having an inlet,

a torch handle connected to the torch head and having a fluid conduit for each passageway in fluid communication with the respective inlet,

oxygen control means mountable on the torch head to extend into the oxygen passageway for selectively blocking the flow therethrough and adjustably controlling the rate of flow therethrough,

fuel gas control means mountable on the torch head to extend into the fuel gas passageway for selectively blocking the flow therethrough and adjustably controlling the rate of flow therethrough,

a torch tip, and

means for attaching the torch tip to the torch head and cooperating with the torch head to place the torch

tip in fluid communication with said fuel gas and oxygen passageways,

said torch tip including a tip stem having an inlet end in fluid communication with said fuel gas and oxygen passageways, [and] an outlet end, and a tip head joined to the tip outlet end in fluid communication with the tip outlet end and having a substantially arcuate configuration extending angularly between terminal ends about an axis through an angle of at least about 240°, and a maximum angle of about 280°, so as to facilitate easy positioning of the member to be heated through an open side portion of said substantially arcuate tip head for disposition along said axis of said tip head, said tip outlet end of said tip stem being connected to said tip head at a position intermediate said terminal ends of said substantially arcuate tip head,

said tip head comprising a substantially planar member defining a first plane located at a first predetermined axial position along said axis and having a single array of flame outlet orifices, defined within sidewall portions of said tip head and disposed within said first plane of said tip head, comprising [at least a] first, [a] second, and [a] third flame outlet orifices, [the] said three flame outlet orifices being angularly spaced from one another in a

substantially circumferential manner throughout said sub-
stantially arcuate configuration of said tip head such that
two of said flame outlet orifices are located immediately
adjacent to said terminal ends of said substantially arcuate
tip head, said first, second, and third flame outlet orific-
es are disposed in said circumferential manner around said
axis of said tip head such that a substantially complete
circumferential flame array for heating the member can nev-
ertheless be defined along a substantially complete circum-
ferential locus by said three flame outlet orifices, and
said three flame orifices are angularly oriented with re-
spect to said first plane of said tip head so as to [open-
ing] open toward a [common point] single axial position
which is disposed within a second plane which is disposed
parallel to said first plane of said tip head and which is
located at a second predetermined axial position along said
axis of said tip head which is axially offset from said
first predetermined axial position of said first plane of
said tip head and within which said three flame outlet ori-
fices are disposed so as to thereby project flames outwardly
from said three flame outlet orifices at a predetermined
angle with respect to said first plane of said tip head so
as to thereby achieve heating of the member, within and

along said second plane, attendant a metal bonding operation to be achieved along said second plane.

2. (Original) The torch of Claim 1 wherein the orifices are spaced by an angle of at least 100°.

3. (Original) The torch of Claim 1 wherein the outlet orifices are substantially equally angularly spaced from one another.

4. (Cancelled)

5. (Previously Amended) The torch of Claim [4] 1 wherein the third orifice is about midway angularly between the first and second orifices and is angularly spaced from each of the

first and second orifices by an angle of about 120°.

6. (Previously Amended) The torch of Claim 5, wherein:

each one of [the] said orifices is of substantially equal linear spacing from said [point] axis of said tip head [and the tip head extends arcuately through an angle of less than about 280°].

7. (Previously Amended) The torch of claim 6, wherein:

said [the] tip head has an angularly inner peripheral surface having [the] said orifices opening therethrough, and an angularly outer peripheral surface more remote from said [point] axis of said tip head than [the] said angularly inner peripheral surface, [the] and said tip stem is joined to [an] said angularly outer peripheral surface and has a central axis of elongation that [extends through] intersects said [point] axis of said tip head.

8. (Original) The torch of claim 7 wherein the tip stem is joined to the tip head angularly about midway between the first and the third orifices.

9. (Currently Amended) A torch tip adapted for use with a fuel gas torch to heat or solder a metal structure such as tubular members, comprising:

an elongated tip stem having an inlet end and an outlet end and an elongated tubular tip head arcuately curved about a common point and spaced therefrom, said tip head being of an arcuate length [to] and comprising a fluid passageway extending angularly between terminal ends about an axis through an angle of at least about [245°] 240°, and a maximum angle of about 280°, relative to said common point so as to facilitate easy positioning of a tubular member to be heated through an open side portion of said substantially arcuate tip head for disposition along said axis of said tip head, said tip outlet end of said tip stem being connected to said tip head at a position intermediate said terminal ends of said substantially arcuate tip head, [and having first and second closed ends and a fluid passageway extend-

ing between the closed ends,] said tip head [having] further comprising an angularly inner peripheral surface and an angularly outer peripheral surface more remotely spaced from said common point along its length than the angularly inner peripheral surface, [said inner peripheral surface having several outlet orifice opening therethrough toward said common point and to the tip head passageway and being substantially equally angularly spaced from one another,] the tip stem having a passageway extending from the stem inlet end and opening to the tip head passageway,

said tip head further comprising a substantially planar member defining a first plane located at a first predetermined axial position along said axis and having a single array of flame outlet orifices, defined within sidewall portions of said inner peripheral surface of said tip head and disposed within said first plane of said tip head, comprising first, second, and third flame outlet orifices, said three flame outlet orifices being angularly spaced from one another in a substantially circumferential manner throughout said substantially arcuate configuration of said tip head such that two of said flame outlet orifices are located immediately adjacent to said terminal ends of said substantially arcuate tip head, said first, second, and third flame

outlet orifices are disposed in said circumferential manner around said axis of said tip head such that a substantially complete circumferential flame array for heating the tubular member can nevertheless be defined along a substantially complete circumferential locus by said three flame outlet orifices, and said three flame orifices are angularly oriented with respect to said first plane of said tip head so as to open toward a single axial position which is disposed within a second plane which is disposed parallel to said first plane of said tip head and which is located at a second predetermined axial position along said axis of said tip head which is axially offset from said first predetermined axial position of said first plane of said tip head and within which said three flame outlet orifices are disposed so as to thereby project flames outwardly from said three flame outlet orifices at a predetermined angle with respect to said first plane of said tip head so as to thereby achieve heating of the tubular member, within and along said second plane, attendant a metal bonding operation to be achieved along said second plane.

10. (Previously Amended) The torch tip of Claim 9, wherein:

[the orifices include a first orifice adjacent to the first head end, a second orifice adjacent to the second head end, and] said third one of said orifices is angularly disposed substantially [about] midway between [the] said first and second orifices.

11. (Previously Amended) The torch tip of claim 10, wherein:

said [the] tip stem has a central axis of elongation that [extends through] intersects said [point] axis of said tip head and extends [angularly] away from said [point] axis of said tip head about midway between [the] said first and third orifices.

12. (Original) The torch tip of claim 10 wherein the third orifice angularly is spaced about 120 degrees from each of the first and second orifices and the torch head extends angularly through an angle less than about 280°.

13. (New) A torch for heating a member at-tendant a metal bonding operation, comprising:

a torch head having a fuel gas passageway provided therein;

a torch handle connected to said torch head and having a fuel gas conduit provided therein and connected to said fuel gas passageway of said torch head for providing fuel gas to said fuel gas passageway;

fuel gas control means mounted upon said torch head and operatively associated with said fuel gas passageway provided within said torch head for selectively controlling the rate of flow of said fuel gas through said fuel gas passageway provided within said torch head;

a torch tip; and

means for mounting said torch tip upon said torch head such that said torch tip is disposed in fluidic communication with said fuel gas passageway of said torch head;

said torch tip comprising a tip head having a substantially arcuate configuration, extending angularly between terminal ends about an axis through an angular extent of at least substantially 240°, and a maximum angle of approximately 280°, so as to facilitate easy positioning of a member to be heated through an open side portion of said

substantially arcuate tip head for disposition along said axis of said tip head,

said tip head comprising a substantially planar member defining a first plane located at a first predetermined axial position along said axis and having a single array of flame outlet orifices, defined within sidewall portions of said tip head and disposed within said first plane of said tip head, comprising first, second, and third flame outlet orifices, said three flame outlet orifices being equiangularly spaced from one another in a substantially circumferential manner throughout said substantially arcuate configuration of said tip head such that two of said flame outlet orifices are located immediately adjacent to said terminal ends of said substantially arcuate tip head, said first, second, and third flame outlet orifices are disposed in said circumferential manner around said axis of said tip head such that a substantially complete circumferential flame array for heating the member can nevertheless be defined along a substantially complete circumferential locus by said three flame outlet orifices, and said three flame orifices are angularly oriented with respect to said first plane of said tip head so as to open toward a single axial position which is disposed within a second plane which is

disposed parallel to said first plane of said tip head and which is located at a second predetermined axial position along said axis of said tip head which is axially offset from said first predetermined axial position of said first plane of said tip head and within which said three flame outlet orifices are disposed so as to thereby project flames outwardly from said flame outlet orifices at a predetermined angle with respect to said first plane of said tip head so as to thereby achieve heating of the member, within and along said second plane, attendant a metal bonding operation to be achieved along said second plane.

14. (New) The torch as set forth in Claim 13, wherein:

said substantially arcuate tip head has a substantially arcuate inner peripheral surface and a substantially arcuate outer peripheral surface more remote from said common point than said substantially arcuate inner peripheral surface; and

said three flame outlet orifices are substantially defined upon said substantially arcuate inner peripheral surface of said tip head.

15. (Previously Presented) The torch as set forth in Claim 13, further comprising:

an oxygen passageway defined within said torch head;

an oxygen conduit provided within said torch handle and fluidically connected to said oxygen passageway defined within said torch head for providing oxygen to said oxygen passageway; and

oxygen control means mounted upon said torch head and operatively associated with said oxygen passageway provided within said torch head for selectively controlling the rate of flow of said oxygen through said oxygen passageway provided within said torch head.

16. (New) A torch for heating a member attendant a metal bonding operation, comprising:

a torch head having an air passageway and a fuel gas passageway formed therein, each passageway having an inlet;

a torch handle connected to said torch head and having a fluid conduit for each passageway in fluid communi-

cation with the respective inlet;

air control means mounted upon said torch head and operatively associated with said air passageway provided within said torch head for selectively blocking the flow therethrough and adjustably controlling the rate of flow therethrough;

fuel gas control means mounted upon said torch head and operatively associated with said fuel gas passageway provided within said torch head for selectively blocking the flow therethrough and adjustably controlling the rate of flow therethrough;

a torch tip; and

means for attaching said torch tip to said torch head and cooperating with said torch head so as to place said torch tip in fluid communication with said fuel gas and air passageways;

said torch tip including a tip stem having an inlet end in fluid communication with said fuel gas and air passageways, an outlet end, and a tip head joined to said tip outlet end in fluid communication with said tip outlet end and having a substantially arcuate configuration extending angularly between terminal ends about an axis through an angle of at least about 240°, and a maximum angle of about

280°, so as to facilitate easy positioning of the member to be heated through an open side portion of said substantially arcuate tip head for disposition along said axis of said tip head, said tip outlet end of said tip stem being connected to said tip head at a position intermediate said terminal ends of said substantially arcuate tip head;

said tip head comprising a substantially planar member defining a first plane located at a first predetermined axial position along said axis and having a single array of flame outlet orifices, defined within sidewall portions of said tip head and disposed within said first plane of said tip head, comprising first, second, and third flame outlet orifices, said three flame outlet orifices being angularly spaced from one another in a substantially circumferential manner throughout said substantially arcuate configuration of said tip head such that two of said flame outlet orifices are located immediately adjacent to said terminal ends of said substantially arcuate tip head, said first, second, and third flame outlet orifices are disposed in said circumferential manner around said axis of said tip head such that a substantially complete circumferential flame array for heating the member can nevertheless be defined along a substantially complete circumferential locus by said three

flame outlet orifices, and said three flame orifices are angularly oriented with respect to said first plane of said tip head so as to open toward a single axial position which is disposed within a second plane which is disposed parallel to said first plane of said tip head and which is located at a second predetermined axial position along said axis of said tip head which is axially offset from said first predetermined axial position of said first plane of said tip head and within which said three flame outlet orifices are disposed so as to thereby project flames outwardly from said flame outlet orifices at a predetermined angle with respect to said first plane of said tip head so as to thereby achieve heating of the member, within and along said second plane, attendant a metal bonding operation to be achieved along said second plane.

17. (New) The torch as set forth in Claim 16, wherein:

said predetermined angle at which said flames are projected outwardly from said three flame outlet orifices, with respect to said plane within which said substantially planar tip head is disposed, is within the range of 20-35°.

18. (New) The torch as set forth in Claim 16, wherein:

said first, second, and third flame outlet orifices are substantially equiangularly spaced from each other through an angle of approximately 120°.

19. (Previously Presented) The torch as set forth in Claim 16, wherein:

said third orifice is interposed substantially midway between said first and second orifices.

20. (New) A torch tip for use with a fuel gas torch for heating tubular members, comprising:

a tip stem having a first end for connection to a torch head of a fuel gas torch; and

a tip head connected to a second end of said tip stem,

said tip head comprising a substantially arcuate tubular member extending between terminal ends through an angular extent of at least substantially 240°, and a maximum

angle of substantially 280°, about an axis and radially spaced therefrom, so as to facilitate easy positioning of a member to be heated through an open side portion of said substantially arcuate tip head for disposition along said axis of said tip head, said tip outlet end of said tip stem being connected to said tip head at a position intermediate said terminal ends of said substantially arcuate tip head, and further comprising a substantially planar member defining a first plane located at a first predetermined axial position along said axis and having a single array of flame outlet orifices, defined within sidewall portions of said tip head and disposed within said first plane of said tip head, comprising first, second, and third flame outlet orifices, said three flame outlet orifices being equiangularly spaced from one another in a substantially circumferential manner throughout said substantially arcuate configuration of said tip head such that two of said flame outlet orifices are located immediately adjacent to said terminal ends of said substantially arcuate tip head, said first, second, and third flame outlet orifices are disposed in said circumferential manner around said axis of said tip head such that a substantially complete circumferential flame array for heating the member can nevertheless be defined along a substan-

tially complete circumferential locus by said three flame outlet orifices, and said three flame orifices are angularly oriented with respect to said first plane of said tip head so as to open toward a single axial position which is disposed within a second plane which is disposed parallel to said first plane of said tip head and which is located at a second predetermined axial position along said axis of said tip head which is axially offset from said first predetermined axial position of said first plane of said tip head and within which said three flame outlet orifices are disposed so as to thereby project flames outwardly from said flame outlet orifices at a predetermined angle with respect to said first plane of said tip head so as to thereby achieve heating of the member, within and along said second plane, attendant a metal bonding operation to be achieved along said second plane.

21. (New) The torch as set forth in Claim 20, wherein:

said substantially arcuate tip head has a substantially arcuate inner peripheral surface and a substantially arcuate outer peripheral surface more remote from said com-

mon point than said substantially arcuate inner peripheral surface; and

said three flame outlet orifices are substantially defined upon said substantially arcuate inner peripheral surface of said tip head.

22. (New) The torch tip as set forth in Claim 20, wherein:

said three flame outlet orifices of said tip head comprise a first orifice disposed adjacent to a first end of said tip head, a second orifice disposed adjacent to a second end of said tip head, and a third orifice interposed substantially midway between said first and second orifices.

23. (Previously Presented) The torch tip as set forth in Claim 21, wherein:

said tip stem is joined to said angularly outer peripheral surface and has a central axis of elongation that intersects said axis of said tip head.

24. (New) The torch tip as set forth in Claim 20, wherein:

said predetermined angle at which said flames are projected outwardly from said three flame outlet orifices, toward said axis, and with respect to said plane within which said substantially planar tip head is disposed, is within the range of 20-35°.

25. (Previously Presented) The torch as set forth in Claim 22, wherein:

said tip stem is joined to said tip head approximately midway between said first and third orifices.

26. (New) The torch tip as set forth in Claim 9, wherein:

said predetermined angle at which said flames are projected outwardly from said three flame outlet orifices, toward said axis of said tip head, and with respect to said plane within which said substantially planar tip head is disposed, is within the range of 20-35°.